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HARNESS, DICKY & PIERCE, P.L.C.			GARCIA JR, RENE	
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BLOOMFIELD HILLS, MI 48303			2853	

DATE MAILED: 08/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/806,030

Applicant(s)

HIGUCHI ET AL.

Examiner

Rene Garcia, Jr.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,19-22,35-38 and 40-59 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 52-57 and 59 is/are allowed.
- 6) ☒ Claim(s) 1,2,19,20,22,35-38,40-46 and 58 is/are rejected.
- 7) ☒ Claim(s) 21 and 47-51 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 6/8/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Withdraw of Allowable Subject Matter

1. The indicated allowable subject matter of claims 43-46 is withdrawn. Fukano (JP 63-141750) [which has been translated for pending related application 10/789,819] includes relevant teachings of using a waveform shaping circuit that shapes the voltage waveform as outlined in rejection following.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 2, 40-46 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukano (JP 63-141750) in view of Fujii (US 6,299,277).

Fukano discloses the following claimed limitations:

*regarding claims 1 and 43, droplet ejection apparatus/**inkjet recording device**/ (page 2, line 13) having a driving circuit/**buffers, 1 & 2; transistors, 4, 5 & 6; resistance, 12, 13, 14 & 15**/ (fig1; page 4, lines 19-21), and a droplet ejection head/**inkjet recording head, 28**/ (fig. 3; page 3 line 23) including a cavity/**ink chamber, 23**/ filled with a liquid/**ink**/ (fig. 3; page 3 lines 23-24), a nozzle/**25**/ communicated with the cavity/**23**/, and an actuator/**piezo-electric element,**

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9/ (fig 3; page 4 line 3) driven by the driving circuit, the droplet ejection head/28/ ejecting the liquid/ink/ within the cavity/23/ through the nozzle/25/ in the form of droplets (page 6 lines 12-14) by driving the actuator/9/ by driving the actuator/9/ with the driving circuit/buffers, 1 & 2; transistors, 4, 5 & 6; resistance, 12, 13, 14 & 15/, the droplet ejection apparatus/inkjet recording device/ comprising:

*residual vibration detecting means (page 6 line 17 – page 7 line 2)for detecting a residual vibration of the diaphragm/oscillating plate, 26/ (fig. 3; page 4 lines 1-2) displaced by the driving of the actuator/piezo-electric element, 9/ (fig 3; page 4 line 3)

*storage means/waveform rectifying circuit; transistor, 8; resistance, 19-21; buffer, 3/ (page 7, lines 13-18; no recitation on how long the vibration pattern is to be stored i.e. enough to compare period of time T_2) for storing a vibration pattern of the residual vibration of the diaphragm/oscillating plate, 26/ detected by the residual vibration detecting means and/or information obtained from the vibration pattern

*ejection failure detecting means/buffer, 3; transistors, 7 & 8; diode, 11; capacitor, 10; resistance 16-21/ (fig 1; page 5 lines 14-16) for detecting an ejection failure of the droplet ejection heads and a cause thereof (page 6 line 20 – page 7 line 2)

*wherein the droplet ejection apparatus is constructed so that, the actuator/9/ is driven by the driving circuit/buffers, 1 & 2; transistors, 4, 5 & 6; resistance, 12, 13, 14 & 15/ (fig1; page 4, lines 19-21), the residual vibration detecting means detects the residual vibration of the diaphragm/26/ displaced by the driving of the actuator/9/, and the storage means stores the vibration pattern of the residual vibration of the diaphragm/26/ detected by the residual vibration

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detecting means and/or the information obtained from the vibration pattern (page 6 line 17 – page 7 line 2; page 7, lines 13-18)

*wherein ejection failure detecting means/**buffer, 3; transistors, 7 & 8; diode, 11; capacitor, 10; resistance 16-21/** (fig 1; page 5 lines 14-16) includes an oscillation circuit/**piezo-electric element, 9 & resistance, 13 & 14/** (fig. 1; page 5 lines 17-20) that oscillates in response to an electric capacitance component of the actuator/**9/** that varies with the residual vibration of the diaphragm/**oscillating plate, 26/** (page 5 line 21 – page 6 line 16)

*regarding claim 2, residual vibration of the diaphragm/**oscillating plate, 26/** detected by the residual vibration detecting means is a residual vibration of the diaphragm/**26/** when the actuator/**piezo-electric element, 9/** is driven by the driving circuit/ **buffers, 1 & 2; transistors, 4, 5 & 6; resistance, 12, 13, 14 & 15/** (fig1; page 4, lines 19-21) to such an extent that a droplet (page 6 lines 12-14) is not ejected (page 6, lines 20-21 – case when out of ink)

*regarding claim 40, the actuator/**piezo-electric element, 9/** includes the electric capacitance component that varies with the residual vibration of the diaphragm/**oscillating plate, 26/** (page 5 line 21 – page 6 line 16)

*regarding claim 41, ejection failure detecting means/**buffer, 3; transistors, 7 & 8; diode, 11; capacitor, 10; resistance 16-21/** (fig 1; page 5 lines 14-16) includes a resistor element/**resistance, 16/** connected to the actuator/**piezo-electric element, 9/**, and the oscillation circuit/**piezo-electric element, 9 & resistance, 13 & 14/** (fig. 1; page 5 lines 17-20) forms a CR

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oscillation circuit/**capacitor, 10 & resistance, 16/** based on the electric capacitance component of the actuator/**9/** and a resistance component of the resistor element/**16/** (fig 1; page 4 lines 22-24)

*regarding claim 42, ejection failure detecting means/**buffer, 3; transistors, 7 & 8; diode, 11; capacitor, 10; resistance 16-21/** (fig 1; page 5 lines 14-16) includes an F/V converting circuit/**waveform rectifying circuit/** that generates a voltage waveform (fig. 4d page 7 lines 13-15; fig. 5d page 8 line 2-4) in response to the residual vibration of the diaphragm/**26/** from a predetermined group of signals (fig. 2) generated based on changes in an oscillation frequency of an output signal from the oscillation circuit (page 7 line 13- page 8 line 19)

*further regarding claim 43, waveform shaping circuit/**capacitor, 10; diode, 11; resistance, 16/** (fig. 2; page 7 lines 3-13) that shapes the voltage waveform in response to the residual vibration of the diaphragm generated by the F/V converting circuit into a predetermined waveform (fig. 4c; fig. 5c)

*regarding claim 44, waveform shaping circuit includes: DC component eliminating means/**capacitor, 10/** for eliminating a direct current component from the voltage waveform of the residual vibration of the diaphragm generated by the F/V converting circuit (page 7 line 7-10)

*comparator (page 8 line 20 – page 9 line 5) that compares the voltage waveform from which the direct current component thereof has been eliminated by the DC component

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eliminating means with a predetermined voltage value; and wherein the comparator generates and outputs a rectangular wave (fig. 4d; fig 5d) based on this voltage comparison

Fukano does not disclose the following claimed limitations:

- *regarding claims 1 and 43, main power supply for supplying a power to the apparatus

- *power cutoff detecting means for detecting cutoff of the main power supply

- *standby power supply which supplies a power to the apparatus when the power cutoff detecting means detects the cutoff of the main power supply

- *wherein the droplet ejection apparatus is constructed so that, when the cutoff of the main power supply is detected by the power cutoff detecting means, the actuator is driven by the driving circuit

- *regarding claim 45, ejection failure detecting means includes measuring means for measuring the cycle of the residual vibration of the diaphragm based on the rectangular wave generated by the waveform shaping circuit

- *regarding claim 46, measuring means has a counter, and measures either a time between rising edges of the rectangular wave or a time between a rising edge and falling edge of the rectangular wave by counting pulses of a reference signal with the counter

- *regarding claim 58, residual vibration of the diaphragm detected by the residual vibration detecting means is a residual vibration of the diaphragm when the actuator is driven by

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the driving circuit to such an extent that a droplet is not ejected (page 6, lines 20-23; case where runs out of ink)

Fujii discloses the following:

*regarding claims 1 and 43, main power supply/41/ for supplying a power to the apparatus/**ink jet printer, 1/**

*power cutoff detecting means (col. 8, lines 24-31) for detecting cutoff of the main power supply/41/

*standby power supply/**battery power supply, 42/** which supplies a power to the apparatus/1/ when the power cutoff detecting means detects the cutoff of the main power supply/41/ (col. 8, lines 24-31; figs. 2 and 3) for the purpose of saving various kinds of data and information on various flags in a save battery area within RAM.

*wherein the droplet ejection apparatus/**ink jet printer,1/** is constructed so that, when the cutoff of the main power supply/41/ is detected by the power cutoff detecting means(col. 8, lines 24-31), the actuator is driven by the driving circuit (col. 8, lines 20-30 – continues a flushing operation) for the purpose of preventing clogging of the nozzle

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize a main power supply for supplying a power to the apparatus, power cutoff detecting means for detecting cutoff of the main power supply, standby power supply which supplies a power to the apparatus when the power cutoff detecting means detects the cutoff of the main power supply; and wherein the droplet ejection apparatus is constructed so that, when the cutoff of the main power supply is detected by the power cutoff detecting means, the actuator is driven by the driving circuit as taught by Fujii into Fukano for the purpose of

saving various kinds of data and information on various flags in a save battery area within RAM;
and preventing clogging of the nozzle

Fukano discloses the following:

*regarding claim 45, ejection failure detecting means/**buffer, 3; transistors, 7 & 8; diode, 11; capacitor, 10; resistance 16-21/** (fig 1; page 5 lines 14-16) includes measuring means for measuring the cycle of the residual vibration of the diaphragm/**26/** based on the rectangular wave generated by the waveform shaping circuit (page 6, line 20 – page 7 line 2; detects the period of the oscillating waveform to determine if bubble occurs or runs out of ink, therefore has implied measuring means) for the purpose of comparing waveforms to detect ejection failure

*regarding claim 46, measuring means has a counter, and measures either a time between rising edges of the rectangular wave or a time between a rising edge and falling edge of the rectangular wave by counting pulses of a reference signal with the counter (since has implied measuring means, as stated with regards to claim 17, has to have a way to count a time period associated with waveform [page 8 line 2-6] to compare T_2 to normal) for the purpose of comparing waveforms to detect ejection failure

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize ejection failure detecting means includes measuring means for measuring the cycle of the residual vibration of the diaphragm based on the rectangular wave generated by the waveform shaping circuit; and measuring means has a counter, and measures either a time between rising edges of the rectangular wave or a time between a rising edge and

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falling edge of the rectangular wave by counting pulses of a reference signal with the counter as taught by Fukano for the purpose of comparing waveforms to detect ejection failure

5. Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukano (JP 63-141750) as modified by Fujii (US 6,299,277) as applied to claim 1 above, and further in view of Takazawa et al. (US 2002/0018090).

Fukano as modified by Fujii discloses the following claimed limitations:

*regarding claim 20, vibration pattern of the residual vibration of the diaphragm/**oscillating plate, 26/** includes a cycle of the residual vibration (fig. 2, 4,5; page 6, lines 17-20)

Fukano as modified by Fujii does not disclose the following claimed limitations:

* regarding claim 19, ejection failure detecting means for detecting an ejection failure of the droplet ejection heads and a cause thereof

*wherein, when the cutoff of the main power supply is detected by the power cutoff detecting means, the ejection failure detecting means detects an ejection failure of the droplet ejection heads and the cause thereof on the basis of the vibration pattern of the residual vibration of the diaphragm, and the storage means stores the detection result as the information obtained from the vibration pattern

Takazawa et al. disclose the following:

*regarding claim 19, ejection failure detecting means for detecting an ejection failure of the droplet ejection heads and a cause thereof (paragraphs 0004, 0005, 0011, 0101, and 0122) for the purpose of maintaining print quality

*wherein, when the cutoff of the main power supply is detected by the power cutoff detecting means, the ejection failure detecting means detects an ejection failure of the droplet ejection heads and the cause thereof on the basis of the vibration pattern of the residual vibration of the diaphragm, and the storage means stores the detection result as the information obtained from the vibration pattern

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize an ejection failure detecting means for detecting an ejection failure of the droplet ejection heads and a cause thereof, wherein, when the cutoff of the main power supply is detected by the power cutoff detecting means, the ejection failure detecting means detects an ejection failure of the droplet ejection heads and the cause thereof on the basis of the vibration pattern of the residual vibration of the diaphragm, and the storage means stores the detection result as the information obtained from the vibration pattern as taught by Takazawa et al. into Fukano as modified by Fujii for the purpose of maintaining print quality.

6. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukano (JP 63-141750) as modified by Fujii (US 6,299,277) and Takazawa et al. (US 2002/0018090) as applied to claim 19 above, and further in view of Usui (US 6,820,955).

Fukano as modified by Fujii and Takazawa et al. disclose all the claimed limitations except for the following:

*regarding claim 22, recovery means for carrying out recovery processing for the droplet ejection heads in accordance with the cause of the ejection failure to eliminate an ejection failure

*wherein, when the main power supply is switched on after the cutoff of the main power supply has been detected by the power cutoff detecting means, the recovery means carries out the

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recovery processing for the droplet ejection heads in accordance with the cause of the ejection failure to eliminate the cause of the ejection failure by using the detection result stored in the storage means

Usui disclose the following:

*regarding claim 22, recovery means for carrying out recovery processing for the droplet ejection heads in accordance with the cause of the ejection failure to eliminate an ejection failure (figs. 5 and 10; col. 22, line 60- col. 23, line 53; obtains temperature information and with respect to downtime adjust driving signal – prepares for printing commands) for the purpose of maintaining a quality print image

*wherein, when the main power supply is switched on after the cutoff of the main power supply has been detected by the power cutoff detecting means, the recovery means carries out the recovery processing for the droplet ejection heads in accordance with the cause of the ejection failure to eliminate the cause of the ejection failure by using the detection result stored in the storage means for the purpose of maintaining a quality print image

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize a recovery means for carrying out recovery processing for the droplet ejection heads in accordance with the cause of the ejection failure to eliminate an ejection failure, wherein, when the main power supply is switched on after the cutoff of the main power supply has been detected by the power cutoff detecting means, the recovery means carries out the recovery processing for the droplet ejection heads in accordance with the cause of the ejection failure to eliminate the cause of the ejection failure by using the detection result stored in the storage means as taught by Usui into Fukano as modified by Fujii and Takazawa et al. for the

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purposes of determining if any print head maintenance is necessary; and maintaining a quality print image.

7. Claims 35-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukano (JP 63-141750) as modified by Fujii (US 6,299,277), Takazawa et al. (US 2002/0018090) and Usui (US 6,820,955) as applied to claim 22 above, and further in view of Yamaguchi et al. (US 5,379,061)

Fukano as modified by Fujii, Takazawa et al. and Usui disclose the following claimed limitations:

*regarding claim 38, recovery means carries out the flushing process or the pump-suction process in the case where a cause of the ejection failure of the droplet ejection heads is thickening of the liquid in the vicinity of the nozzle due to drying (Fujii; col. 8, line 20-50 & col. 2, lines 5-27)

Fukano as modified by Fujii, Takazawa et al. and Usui does not disclose the following:

*regarding claim 35, recovery means includes: wiping means for carrying out a wiping process in which a nozzle surface of the droplet ejection heads where the nozzles are arranged is wiped with a wiper; flushing means for carrying out a flushing process by which the droplets are preliminarily ejected through the nozzles of the droplet ejection heads by driving the actuator; and pumping means for carrying out a pump-suction process with the use of a pump connected to a cap that covers the nozzle surface of the droplet ejection heads

*regarding claim 36, recovery means carries out the pump-suction process in the case where a cause of the ejection failure of the droplet ejection heads is intrusion of an air bubble into the cavity

*regarding claim 37, recovery means carries out at least the wiping process in the case where a cause of the ejection failure of the droplet ejection heads is adhesion of paper dust in the vicinity of an outlet of the nozzle

Yamaguchi et al. disclose the following:

*regarding claim 35, recovery means includes: wiping means for carrying out a wiping process in which a nozzle surface of the droplet ejection heads where the nozzles are arranged is wiped with a wiper (col. 25, line 44 – col. 26, line 5); flushing means for carrying out a flushing process by which the droplets are preliminarily ejected through the nozzles of the droplet ejection heads by driving the actuator (col. 5, line 19 – col. 6, line 7); and pumping means for carrying out a pump-suction process with the use of a pump connected to a cap that covers the nozzle surface of the droplet ejection heads (col. 5, line 19 – col. 6, line 7) for the purpose of removing any air bubbles or debris that may adversely affect print quality

*regarding claim 36, recovery means carries out the pump-suction process in the case where a cause of the ejection failure of the droplet ejection heads is intrusion of an air bubble into the cavity (col. 6, lines 26-33) for the purpose of removing air in the system to maintaining proper functioning of nozzles

*regarding claim 37, recovery means carries out at least the wiping process in the case where a cause of the ejection failure of the droplet ejection heads is adhesion of paper dust in the vicinity of an outlet of the nozzle (col. 25, line 44 – col. 26, line 5) for the purpose of removing any debris that may adversely affect print quality

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize a recovery means including: wiping means for carrying out a wiping process in which a nozzle surface of the droplet ejection heads where the nozzles are arranged is wiped with a wiper; flushing means for carrying out a flushing process by which the droplets are preliminarily ejected through the nozzles of the droplet ejection heads by driving the actuator; and pumping means for carrying out a pump-suction process with the use of a pump connected to a cap that covers the nozzle surface of the droplet ejection heads; recovery means carries out the pump-suction process in the case where a cause of the ejection failure of the droplet ejection heads is intrusion of an air bubble into the cavity; and recovery means carries out at least the wiping process in the case where a cause of the ejection failure of the droplet ejection heads is adhesion of paper dust in the vicinity of an outlet of the nozzle as taught by Yamaguchi et al. into Fukano as modified by Fujii, Takazawa et al. and Usui for the purposes of removing any air bubbles or debris that may adversely affect print quality; removing air in the system to maintaining proper functioning of nozzles; and removing any debris that may adversely affect print quality.

Allowable Subject Matter

8. Claims 21 and 47-51 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: The primary reason for indicating allowable subject matter of claims 21 and 47-51 is the inclusion of the limitation of a droplet ejection apparatus including judging means judges that paper dust is adhering in the vicinity of the outlet of the nozzle in the case where the cycle of the residual vibration of the diaphragm is longer than the predetermined range of cycle and shorter than the predetermined threshold. It is this limitation found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

10. Claims 52-57 and 59 are allowed.


11. The following is an examiner's statement of reasons for allowance: The primary reason for the allowance of claims 52-57 and 59 is the inclusion of the limitation of a droplet ejection apparatus including judging means judges that paper dust is adhering in the vicinity of the outlet of the nozzle in the case where the cycle of the residual vibration of the diaphragm is longer than the predetermined range of cycle and shorter than the predetermined threshold. It is this limitation found in each of the claims, as it is claimed in the combination, that has not been found, taught or suggested by the prior art of record which makes these claims allowable over the prior art.

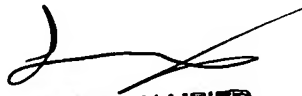
Communications with the USPTO

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rene Garcia, Jr. whose telephone number is (571) 272-5980. The examiner can normally be reached on M-F 8:00AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Rene Garcia Jr
08/06


STEPHEN MEIER
SUPERVISORY PATENT EXAMINER